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SYSTEMATICS OF AEDES MOSQUITO PROJECT

ANNUAL REPORT

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The Systematics of Aedes Mosquito Project (SAMP), a cooperative venture between the Smithsonian Institution and the U.S. Army Medical Research and Development Command, conducts biosystematic research on mosquitoes of medical importance to the Army. SAMP fulfills these objectives by performing biosystematic studies on important groups of aedine vectors of arboviruses. SAMP provides information on potential vectors for the guidance of military field research teams and other governmental agencies and prepares monographs and technical papers, which summarize data on the ecology, taxonomy and medical importance of these vectors in Africa. In addition, SAMP performs curation and research on the national collection of mosquitoes at the National Museum of Natural History (NMNH), Smithsonian Institution.

Research continues on the arbovirus vector groups of the subgenus Stegomyia, genus Aedes, of the Afrotropical Region. Keywords

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INTRODUCTION

Biosystematic studies, which lead to the precise identification of vectors, are fundamental to any investigation of epidemiology and to the planning of control or eradication. These studies enable recognition of the vector(s); further study of the ecology and habits of the vectors; and effective diffusion of information about vectorial capacity, resistance to insecticides, geographic distribution, etc. Many instances of failure to control diseases resulting from vector-borne pathogens can be traced to neglect of this aspect of research in entomology.

The Systematics of Aedes Mosquito Project (SAMP) was developed to perform biosystematic research on medically important mosquitoes to meet the U.S. Army Medical Research and Development Command's requirements for accurate identification of actual or potential mosquito vectors of pathogens of man in Africa. Thus, SAMP is able to respond to these needs, and the resources of the project are used to accomplish these requirements. The research was accomplished by 1 professional entomologist plus the principal investigator. The work was supplemented by 4 professional entomologists from the Walter Reed Biosystematics Unit (WRBU) on assignment to the Smithsonian. In addition, upon request, SAMP assists various military and other medical entomologists in biosystematic studies of medically important mosquitoes. This level of support may range from furnishing entomologists with keys, necessary literature, and other identification guides to the loan of specialized collecting and rearing equipment, which cannot be obtained from other sources. Such support has proven invaluable to all concerned, as the Smithsonian Institution has received extremely worthwhile material from these entomologists.

REVIEW OF PROGRESS FOR THE PERIOD
August 1, 1986 - December 31, 1987 (Dr. Yiau-Min Huang)

1. Biosystematic studies of Aedes

A major portion of this period was devoted to the examination of specimens of African Stegomyia. 398 specimens including 43 male and female genitalia were studied in detail. Other tasks included dissecting genitalia, making slide preparations, identifying specimens, resolving taxonomic problems, preparing descriptions and illustrations, and writing manuscripts for publication.

During this period, two manuscripts were submitted for publication. The first paper, entitled "Aedes (Stegomyia) josiahae, a new species of the simpsoni subgroup (Diptera: Culicidae)" was submitted to the Proceedings of the Entomological Society of Washington. It has been accepted and is scheduled for publication in April, 1988.

The new species belonging to the simpsoni subgroup of the aegypti group was discovered among specimens that were misidentified as Aedes (Stegomyia) kivuensis Edwards, from the Division of Vector Borne Diseases (DVBD) collection in Nairobi, Kenya. Thus the purpose of this paper is to describe the new species, to provide diagnostic characters for separating the new species from Aedes kivuensis and to avoid future confusion between it and Aedes kivuensis. Because of the medical importance of several species in the simpsoni subgroup and as nothing is known about its biting habits and potential as a vector of human pathogens, it is hoped that this paper will stimulate investigations on these subjects.

The second paper, entitled "The Aedes (Stegomyia) pseudonigeria group with emphasis on the Afrotropical Region (Diptera: Culicidae)" has been completed and submitted for publication. It is anticipated that this paper will also be published during 1988. This paper is part I of a revision of the subgenus Stegomyia Theobald, genus Aedes Meigen, in the Afrotropical Region. African species of Stegomyia have been implicated as natural hosts/ vectors/ reservoirs of eight viruses, six of which cause human illness (Chikungunya, dengue 1 and 2, Dugbe, Rift Valley Fever, yellow fever and Zika). Chikungunya, dengue and yellow fever are the most important arobviruses associated with Stegomyia. Despite their medical importance, the published record on African Stegomyia is superficial and inadequate to accurately identify specimens that are critically needed for mosquito surveys, virus isolation and epidemiological studies. Insufficient material and inadequate descriptions have led to confusion and the misidentification of specimens from this area. Thus the need for a thorough study to determine the diversity of species that occur in the area and to develop adequate and reliable methods for recognizing them became evident. The present review is the first of a series that is hoped will eventually complete the task. Subgeneric characters and a classification of the species groups and subgroups will be discussed in a final paper.

In this paper, the pseudonigeria group of the subgenus Stegomyia Theobald (genus Aedes Meigen) is characterized. Diagnostic characters for separating the Aedes pseudonigeria group from other Stegomyia are provided. A key to identify the species is provided. Information on the present status of the pseudonigeria group of species is summarized. Three African species of the pseudonigeria group, of which two are new, are described or redescribed and illustrated. Data on type data, distribution, bionomics, and a taxonomic discussion of each species are presented. One Palearctic species, which is unlikely to be found in the area, is included in the key.

2. Curatorial Activities

During this period, 7 Aedes adult specimens: 2 males and 1 female of Aedes (Verrallina) agrestis Barraud, and 1 male and 3 females of Aedes (Stegomyia) novalbopictus Barraud from India, were received from Dr. R. Reuben, Director, Centre for Research in Medical Entomology, India, as a gift to be deposited in the USNM collection. One lot of eggs of Aedes aegypti complex from Nigeria (Dr. Barry R. Miller, Vector-Virology Laboratory, CDC) was hatched, from which 43 adults with associated larval and pupal skins were obtained. In addition, 141 male and female genitalia were prepared on slides. To date, 283 specimens (associated immature stages) of African Aedes have been slide-mounted.

3. Other Activities

(1) Identifications were made of 101 Aedes (Aedimorphus, Christophersiomyia, Diceromyia, Verrallina, and Stegomyia) mosquitoes from Australia, Brazil, Central African Republic, India, Kenya, Nigeria, Pakistan, Puerto Rico, Sri Lanka, West Indies, and U.S.A. for LTC B.A. Harrison, WRBU; Dr. R.L. de Oliveira, Dept. de Entomologia, Inst. Oswaldo Cruz, Brazil; Mr. S.-Y. Liu, ORG. PAN-AMERICANA DA SAUDE, Brazil; Dr. Barry R. Miller, Vector-Virology Laboratory, Centers for Disease Control (CDC); Dr. R. Reuben, Centre for Research in Medical Entomology, India; Mr. E.L. Peyton, WRBU; CAPT L. Lance Sholdt, Dept. of Preventive Medicine/Biometrics, Uniformed Services University of the Health Sciences (USUHS); Mr. J. Lane, Dept. of Entomology, London School of Hygiene and Tropical Medicine, England.

(2) Assistance was given to Dr. R. Reuben, Director, Centre for Research in Medical Entomology (Indian Council for Medical Research), India, on (a) identification and confirmation of Aedes mosquitoes from India that were identified by her staff, (b) on the morphology of male genitalia of Aedes mosquitoes and the interpretation of structures of male genitalia of Aedes (Verrallina) agrestis Barraud which have not been described, (c) on information regarding the nomenclature of the pupal chaetotoxy and the anomalous setae of mosquitoes, and (d) reviewed and wrote comments, suggestions and correction on 2 manuscripts written by her staff.

Appendix 1: LIST OF SAMP CONSULTANTS

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MAJ Ralph E. Harbach, Ph.D., Department of Entomology, U.S. Army Medical Component, AFRIMS, APO San Francisco, CA 96346. Culex of Southwest Asia

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Dr. Botha de Meillon, Philadelphia, PA. African Culicidae and Ceratopogonidae

Dr. J. Mouchet, ORSTOM, Department of Entomology, Bondy, France. Culicidae

Mr. E L. Peyton, Walter Reed Biosystematics Unit, MSC, Smithsonian Instutition, Washington, D.C. 20560. Anopheles

Dr. Lewis T. Nielsen, Biology Department, University of Utah, Salt Lake City, Utah 84112. North American Aedes (Ochlerotatus)

COL John F. Reinert, Ph.D., Office of the Surgeon General, HQDA (DASG-PSP), 5109 Leesburg Pike, Falls Church, VA 22041-3258. Aedes subgenera

CPT Daniel A. Strickman, Ph.D., Walter Reed Biosystematics Unit, MSC, Smithsonian Institution, Washington, D.C. 20560. Culex

Dr. Ronald A. Ward, Walter Reed Biosystematics Unit, MSC, Smithsonian Institution, Washington, D.C. 20560. New World mosquitoes

Dr. Richard C. Wilkerson, Walter Reed Biosystematics Unit, MSC, Smithsonian Instutition, Washington, D.C. 20560. Neotropical Anopheles

Dr. Thomas J. Zavortink, Department of Biology, University of San Francisco, San Francisco, CA 94117. New World Culicidae, African Aedes (Neomelaniconion)

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